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- (b) joining ends of a strip of coated abrasive with the blocked isocyanate urethane system; and
  - (c) heating the strip to cure the blocked isocyanate urethane system.
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#### REMARKS

Applicants have amended claims 1-8 and 12-15.

Claim 1 has been amended to specify that the isocyanate component of the blocked isocyanate urethane system consists essentially of blocked isocyanate. Support for this amendment is found at page 3, lines 13-24; at page 5, lines 27-29; at page 6, line 19 through page 7, line 5; at page 9, lines 13-23; and in Examples 1 and 3.

Claim 2 has been amended to clarify that the claim is directed to the coated abrasive belt of claim 1 and to clarify the language of the Markush group described therein. Support for the amendment to claim 2 is found at page 3, lines 25-29.

Applicants have amended claims 3-6 to clarify that the claims are directed to the coated abrasive belt of claim 1. Support for these amendments is at page 3, lines 25-29.

Claim 7 was amended to clarify that the claim is directed to the coated abrasive belt of claim 1 and also to clarify that the isocyanate functionality of the prepolymer is blocked. Support for this amendment is found at page 3, lines 13-29.

Claim 8 has been amended to specify that the adhesive is formed from a blocked isocyanate system wherein the isocyanate of the system consists essentially of blocked isocyanate. Support for this amendment is found at page 3, lines 13-24; at page 5, lines 27-29; at page 6, line 19 through page 7, line 5; at page 9, lines 13-23; and in Examples 1 and 3.

Applicants have amended claim 12 to specify that the adhesive is formed from a blocked isocyanate system wherein the isocyanate of the system consists essentially of blocked isocyanate and also to clarify that the ends of a strip of coated abrasive are joined together with the adhesive. Support for this amendment is found at page 3, lines 13-29; at page 5, lines 27-29; at page 6, line 19 through page 7, line 5; at page 9, lines 13-23; and in Examples 1 and 3.

Claim 13, as amended, now comprises forming an isocyanate urethane system wherein the isocyanate of said system consists essentially of at least one compound selected from the group consisting of blocked isocyanate terminated polyurethane prepolymers and blocked

isocyanates. Support for the amendment is found at page 5, lines 27-29; at page 6, line 19 through page 7, line 5; and in Examples 1 and 3.

Claims 14 and 15 were amended to specify that the isocyanate component of the blocked isocyanate urethane system consists essentially of blocked isocyanate. Support for these amendments is found at page 3, lines 13-24; at page 5, lines 27-29; at page 6, line 19 through page 7, line 5; at page 9, lines 13-23; and in Examples 1 and 3.

Claims 1-8 and 12-15 were also amended to remove the comma between "blocked isocyanate" and "urethane system" in several instances. Support for this correction is found, for example, at page 3, lines 3 and 19.

Additional support for the claim amendments is found throughout the specification and claims as originally filed. No new matter has been introduced.

#### **Rejection under 35 U.S.C. §112, Second Paragraph**

The Examiner has rejected Claims 6-7, 14, and 17 under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as their invention. The Examiner states that the term "high molecular weight" is a relative term which is not defined in the claim and for which the specification does not provide a standard for ascertaining the requisite degree.

The fact that claim language, including terms of degree, may not be precise does not automatically render the claim indefinite under 35 U.S.C. 112, second paragraph. *Seattle Box Co. v. Industrial Crating & Packing, Inc.*, 731 F.2d 818, 221 U.S.P.Q. 568 (Fed. Cir. 1984). The acceptability of the claim language depends on whether one of ordinary skill in the art would understand what is claimed, in light of the specification.

One of ordinary skill in the art would recognize that the term "high molecular weight" refers to prepolymer components that when reacted with an appropriate compound, for example, a blocked isocyanate, polyamine, or polyol, produces a polyurethane with adequate physical properties for a belt joint adhesive. One skilled in the art would also recognize that, as stated in the specification, a polyurethane with adequate physical properties for a belt joint adhesive includes a high molecular weight. (See Detailed Description at page 6, lines 15-18). In order to achieve this, one of the components of the polyurethane is a prepolymer. The prepolymer

includes a number of repeating units but also includes at least two reactive groups, usually at the end of a substantially linear polymer. One skilled in the art can select from among commercially available blocked isocyanate prepolymers that meet the criterion of having suitably "high molecular weight" without undue experimentation. Examples of commercially available blocked isocyanate prepolymers include Desmocap and Baypret of Bayer, Adiprene BL-16 of Uniroyal, and Catapol of ARNCO. (See Detailed Description at page 9, lines 11-12).

### **Rejection under 35 U.S.C. § 102**

The Examiner has rejected claims 1-2, 4-8, and 10-17 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 3,770,555 to Gladstone, *et al.*, (hereinafter referred to as "Gladstone") as evidenced by U.S. Patent No. 3,252,848 to Borsellino (hereinafter referred to as "Borsellino"). The Examiner states that Gladstone discloses an adhesive system for joining overlapped ends of a coated abrasive article comprising a component having free isocyanate groups, a hydroxyl terminated polyurethane polyester, and a member containing active hydrogen groups. Further, the Examiner states, Gladstone teaches a method of providing the adhesive as a film on the strip, joining the ends of the strip and heating the adhesive to cure the components. The Examiner also states that Gladstone teaches urethane isocyanate blocked prepolymers and that the Borsellino reference cited by Gladstone teaches polyurethane isocyanate blocked prepolymers where the prepolymers are blocked with oxime blocking agents.

Applicants have amended claims 1-8 and 12-15. The claimed invention, as amended, is directed to coated adhesive belts, and methods for their formation, comprising a blocked isocyanate urethane system wherein the isocyanate of the system consists essentially of blocked isocyanate.

Gladstone discloses a dried, preformed adhesive film that comprises a component having available free isocyanate groups and a poly-functional active hydrogen containing component consisting of a hydroxyl terminated polyurethane polyester and a member containing at least difunctional active hydrogen.

Gladstone neither teaches nor suggests an adhesive formed from a blocked isocyanate urethane system wherein the isocyanate of the system consists essentially of blocked isocyanate. The isocyanate component of the Gladstone adhesive film (described above) is not a blocked

isocyanate but instead has free isocyanate groups. (See Gladstone at column 6, line 48 through column 7, line 3). For example, Gladstone discloses the use of Mondur CB-75, a non-blocked polyurethane prepolymer in solution.

While Gladstone discloses that the member containing at least difunctional active hydrogen can include, among many others, polyester-polyurethane isocyanate blocked prepolymer and a polyether-polyurethane isocyanate blocked prepolymer, these components are not the free isocyanate groups required by Gladstone. As discussed above, Gladstone requires the presence of free isocyanate groups such as provided by Mondur CB-75. Figure 1 of the present disclosure illustrates the limited pot life of a typical prior art joint system such as the free isocyanate containing system of Gladstone. The claimed invention, as amended, provides for blocked isocyanate groups to prevent reaction with active hydrogen groups prior to removal of the blocking groups and produces improved pot life of the isocyanate urethane system and reduced sensitivity to environmental moisture.

### **Rejection under 35 U.S.C. § 103**

The Examiner has rejected claims 2 and 9 under 35 U.S.C. §103(a) as being unpatentable over Gladstone, *et al.* The Examiner states that Gladstone teaches that active hydrogen containing components include isocyanate blocked prepolymers and amine-functional components but the reference does not exemplify the use of both compounds together. The Examiner states that the shelf life can be optimized by choosing different compounds. It is the Examiner's position that it would have been *prima facie* obvious to choose combinations of preferred materials, including an isocyanate blocked prepolymer and an amine-functional component, by conventional experimentation to optimize shelf life of the adhesive.

Applicants have amended claims 1-8 and 12-15. The claimed invention, as amended, is directed to coated adhesive belts, and methods for their formation, comprising a blocked isocyanate urethane system wherein the isocyanate of the system consists essentially of blocked isocyanate. Advantageously, the present invention utilizes blocked isocyanates to improve pot life of the isocyanate urethane system and to reduce sensitivity of the system to the humidity of ambient air. These qualities of the isocyanate urethane system produce more consistent belt joint quality. (See Specification at page 3, lines 19-24; page 2, lines 24-27; and page 6, lines 8-14).

Gladstone does not teach or suggest, as the Examiner implies, choosing components for a blocked isocyanate urethane system wherein the isocyanate of the system consists essentially of blocked isocyanate to improve pot life of the isocyanate urethane system and to reduce sensitivity of the system to the humidity ambient air. Instead, as discussed above, Gladstone discloses a dried, preformed adhesive film formed from an admixture comprising free isocyanate groups. Thus, Gladstone does not teach or suggest a blocked isocyanate urethane system wherein the isocyanate of the system consists essentially of blocked isocyanate and also includes an amine as is presently claimed.

Furthermore, Applicants disagree with the implication by the Examiner that Gladstone discloses that the shelf life can be optimized by choosing different compounds such as a combination including a blocked isocyanate prepolymer and an amine-functional component. Gladstone does not provide any teaching or motivation for a blocked isocyanate urethane system including an amine nor does Gladstone teach or suggest the advantages gained as a result of practicing the claimed invention such as long pot life of a blocked isocyanate urethane system and more consistent belt joint quality. (See Detailed Description at page 6, lines 8-14).

Moreover, one skilled in the art would not have been motivated prepare an isocyanate urethane system for increased pot life comprising free isocyanate groups and also amine groups due to the high reactivity of isocyanate with materials such as amine. (See Specification at page 2, line 24 through page 3, line 3). The isocyanate groups of the claimed system are blocked to prevent reaction with active hydrogen groups prior to removal of the blocking groups and produces improved pot life of the isocyanate urethane system and reduced sensitivity to environmental moisture.

The claimed invention as amended is both novel and nonobvious over Gladstone, *et al.*, both alone and in view of Borsellino. In light of the above arguments, Applicants request reconsideration and withdrawal of the Examiner's rejections under 35 U.S.C. §§ 102(b) and 103(a).

#### Information Disclosure Statement


An Information Disclosure Statement (IDS) is being filed concurrently herewith. Entry of the IDS is respectfully requested.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner believes that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

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MARKED UP VERSION OF AMENDMENTS

Claim Amendments under 37 C.F.R. § 1.121(c)(1)(ii)

1. (Amended) A coated abrasive belt comprising:
  - (a) a strip of coated abrasive having a first portion and a second portion; and
  - (b) a joint adhesive for joining the first portion to the second portion to form the belt, wherein the adhesive is formed from a blocked isocyanate[,] urethane system wherein the isocyanate of said system consists essentially of blocked isocyanate.
2. (Amended) The [adhesive] coated abrasive belt of Claim 1 wherein the blocked isocyanate[, urethane system] includes a blocking agent selected from the group [that includes] consisting of phenols, oximes, alcohols, caprolactam, and diethyl malonate.
3. (Amended) The [adhesive] coated abrasive belt of Claim 1 wherein the blocked isocyanate[, urethane system] includes an amine.
4. (Amended) The [adhesive] coated abrasive belt of Claim 1 wherein the blocked isocyanate[, urethane system] includes an alcohol.
5. (Amended) The [adhesive] coated abrasive belt of Claim 1 wherein the blocked isocyanate[, urethane system] includes a polyol.
6. (Amended) The [adhesive] coated abrasive belt of Claim 1 wherein the blocked isocyanate[, urethane system] includes a high molecular weight prepolymer containing hydroxyl functionality.

7. (Amended) The [adhesive] coated abrasive belt of Claim 1 wherein the blocked isocyanate[,] urethane system includes a high molecular weight prepolymer containing blocked isocyanate functionality.
8. (Amended) A method for forming a coated abrasive belt comprising:
  - (a) providing a coated abrasive strip having first and second opposed ends; and
  - (b) joining the ends of the strip with an adhesive [comprising] formed from a blocked isocyanate[,] urethane system wherein the isocyanate of said system consists essentially of blocked isocyanate.
12. (Amended) A method for forming a coated abrasive belt comprising joining ends of [the belt] a strip of coated abrasive together with an adhesive [comprising] formed from a blocked isocyanate[,] urethane system wherein the isocyanate of said system consists essentially of blocked isocyanate.
13. (Amended) A method for forming a coated abrasive belt comprising:
  - (a) forming a blocked isocyanate[,] urethane system [that includes a blocked isocyanate terminated polyurethane prepolymer] wherein the isocyanate of said system consists essentially of at least one compound selected from the group consisting of blocked isocyanate terminated polyurethane prepolymers and blocked isocyanates;
  - (b) joining ends of a strip of coated abrasive with the blocked isocyanate[,] urethane system; and
  - (c) heating the strip to cure the blocked isocyanate[,] urethane system [to crosslink the blocked isocyanate with a polyamine or a polyol].
14. (Amended) A method for forming a coated abrasive belt comprising:
  - (a) forming a blocked isocyanate[,] urethane system that includes a high molecular weight polyurethane containing hydroxyl functionality and wherein the isocyanate of said system consists essentially of blocked isocyanate;



- (b) joining ends of a strip of coated abrasive with the blocked isocyanate[,] urethane system; and
  - (c) heating the strip to cure the blocked isocyanate[,] urethane system [to crosslink the high molecular weight polyurethane containing hydroxyl functionality with a blocked polyisocyanate].
15. (Amended) A method for forming a coated abrasive belt comprising:
- (a) forming a blocked isocyanate[,] urethane system by mixing a first component with a second component wherein the isocyanate of said system consists essentially of blocked isocyanate;
  - (b) joining ends of a strip of coated abrasive with the blocked isocyanate[,] urethane system; and
  - (c) heating the strip to cure the blocked isocyanate[,] urethane system.